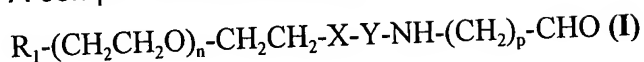


What is claimed is:

1. A compound of formula (I):

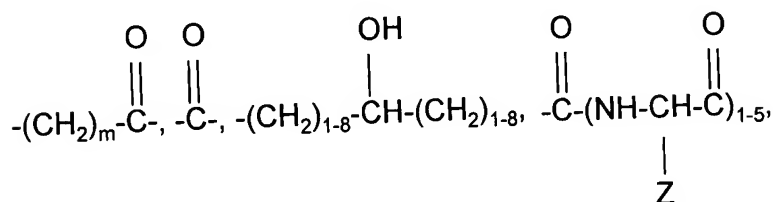


wherein

R_1 is a capping group,

X is O or NH,

Y is selected from the group consisting of



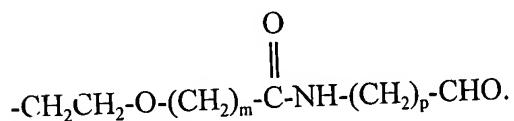
Z is a side chain of an amino acid,

m is from 1 to 17,

n is from 10 to 10,000, and

p is from 1 to 3.

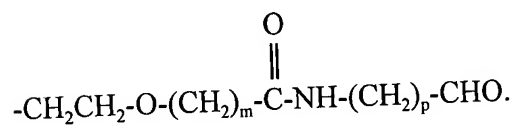
2. A compound according to claim 1, wherein R_1 is selected from the group consisting of halogen, epoxide, maleimide, orthopyridyl disulfide, tosylate, isocyanate, hydrazine hydrate, cyanuric halide, N-succinimidyloxy, sulfo-N-succinimidyloxy, 1-benzotriazolyloxy, 1-imidazolyloxy, p-nitrophenyloxy, and



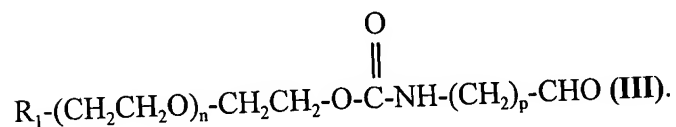
3. A compound according to claim 1, wherein R₁ is selected from the group consisting of hydrogen, hydroxy, lower alkyl, lower alkoxy, lower cycloalkyl, lower alkenyl, aryl, and heteroaryl.

4. A compound according to claim 1, wherein R₁ is selected from the group consisting of methoxy, hydroxy, and benzyloxy.

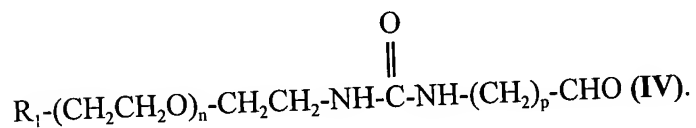
5. A compound according to claim 2, wherein R₁ is



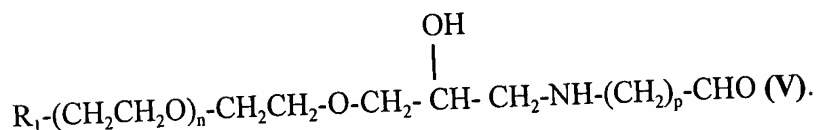
6. A compound according to claim 1 having the formula (III):



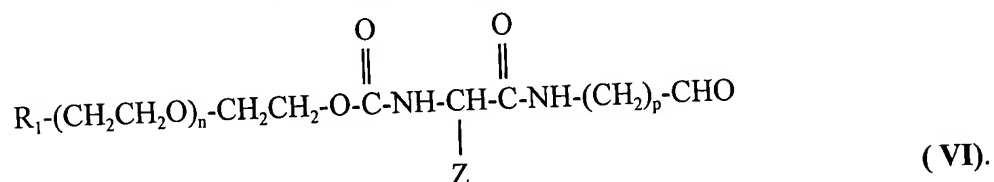
7. A compound according to claim 1 having the formula (IV):



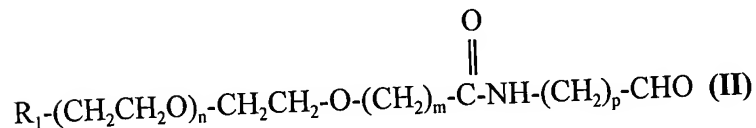
8. A compound according to claim 1 having the formula (V):



9. A compound according to claim 1 having the formula (VI):



10. A compound of formula (II):



wherein

R_1 is a capping group,

m is from 1 to 17,

n is from 10 to 10,000, and

p is from 1 to 3.

11. A compound according to claim 10, wherein p is 3.

12. A compound according to claim 11, wherein R_1 is selected from the group consisting of methoxy, hydroxy, and benzyloxy.

13. A compound according to claim 11, wherein m is from 1 to 14.

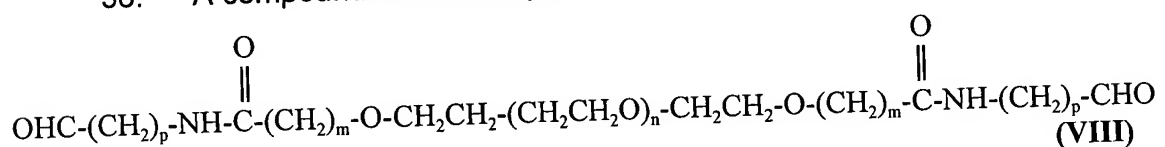
14. A compound according to claim 13, wherein m is from 1 to 7.

15. A compound according to claim 14, wherein m is from 1 to 4.

16. A compound according to claim 11, wherein n is from 20 to 5,000.
17. A compound according to claim 16, wherein n is from 50 to 2,500.
18. A compound according to claim 17, wherein n is from 75 to 1,000.
19. A compound according to claim 10, wherein p is 3, R₁ is methoxy, m is 1, and n is from 100 to 750.
20. A compound according to claim 10, wherein p is 2.
21. A compound according to claim 20, wherein R₁ is selected from the group consisting of methoxy, hydroxy, or benzyloxy.
22. A compound according to claim 20, wherein m is from 1 to 14.
23. A compound according to claim 22, wherein m is from 1 to 7.
24. A compound according to claim 23, wherein m is from 1 to 4.
25. A compound according to claim 20, wherein n is from 20 to 5,000.
26. A compound according to claim 25, wherein n is from 50 to 2,500.
27. A compound according to claim 26, wherein n is from 75 to 1,000.
28. A compound according to claim 10, wherein p is 2, R₁ is methoxy, m is 1, and n is from 100 to 750.

29. A compound according to claim 10, wherein p is 1.
30. A compound according to claim 29, wherein R₁ is selected from the group consisting of methoxy, hydroxy, or benzyloxy.
31. A compound according to claim 29, wherein m is from 1 to 14.
32. A compound according to claim 31, wherein m is from 1 to 7.
33. A compound according to claim 32, wherein m is from 1 to 4.
34. A compound according to claim 29, wherein n is from 20 to 5,000.
35. A compound according to claim 34, wherein n is from 50 to 2,500.
36. A compound according to claim 35, wherein n is from 75 to 1,000.
37. A compound according to claim 10, wherein p is 1, R₁ is methoxy, m is 1, and n is from 100 to 750.

38. A compound of formula (VIII):



wherein

m is from 1 to 17,

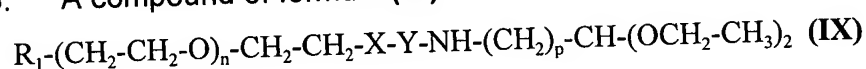
n is from 10 to 10,000, and

p is from 1 to 3.

39. A compound according to claim 38, wherein m is from 1 to 14.

40. A compound according to claim 39, wherein m is from 1 to 7.
41. A compound according to claim 40, wherein m is from 1 to 4.
42. A compound according to claim 38, wherein n is from 20 to 5,000.
43. A compound according to claim 42, wherein n is from 50 to 2,500.
44. A compound according to claim 43, wherein n is from 75 to 1,000.
45. A compound according to claim 38, wherein p is 3, m is 1 and n is from 100 to 750.

46. A compound of formula (IX):

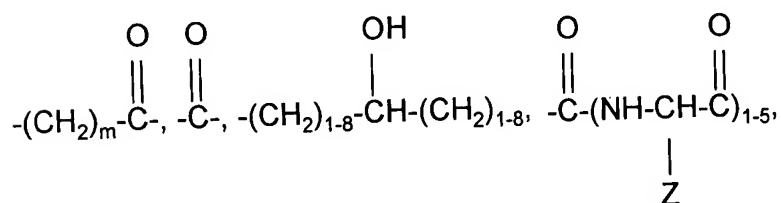


wherein

R_1 is a capping group,

X is O or NH,

Y is selected from the group consisting of



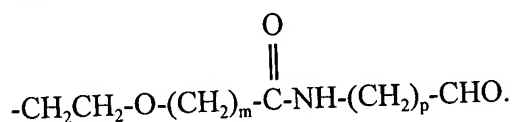
Z is a side chain of an amino acid,

m is from 1 to 17,

n is from 10 to 10,000, and

p is from 1 to 3.

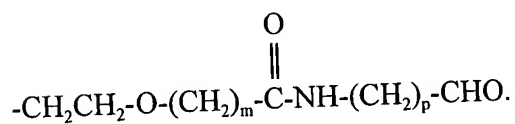
47. A compound according to claim 46, wherein R₁ is selected from the group consisting of halogen, epoxide, maleimide, orthopyridyl disulfide, tosylate, isocyanate, hydrazine hydrate, cyanuric halide, N-succinimidyloxy, sulfo-N-succinimidyloxy, 1-benzotriazolyloxy, 1-imidazolyloxy, p-nitrophenyloxy, and



48. A compound according to claim 46, wherein R₁ is selected from the group consisting of hydrogen, hydroxy, lower alkyl, lower alkoxy, lower cycloalkyl, lower alkenyl, aryl, and heteroaryl.

49. A compound according to claim 46, wherein R₁ is selected from the group consisting of methoxy, hydroxy, and benzyloxy.

50. A compound according to claim 46, wherein R₁ is



51. A compound according to claim 46, wherein m is from 1 to 14.

52. A compound according to claim 51, wherein m is from 1 to 7.

53. A compound according to claim 52, wherein m is from 1 to 4.

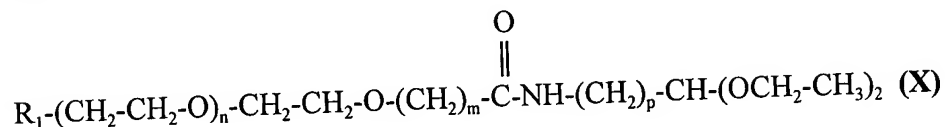
54. A compound according to claim 46, wherein n is from 20 to 5,000.

55. A compound according to claim 54, wherein n is from 50 to 2,500.

56. A compound according to claim 55, wherein n is from 75 to 1,000.

57. A compound according to claim 46, wherein R₁ is methoxy, p is 3, m is 1, and n is from 100 to 750.

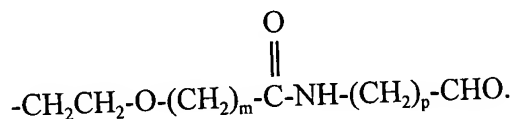
58. A compound of formula (X):



wherein

R₁ is a capping group,
m is from 1 to 17,
n is from 10 to 10,000, and
p is from 1 to 3.

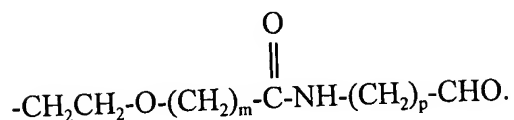
59. A compound according to claim 58, wherein R₁ is selected from the group consisting of halogen, epoxide, maleimide, orthopyridyl disulfide, tosylate, isocyanate, hydrazine hydrate, cyanuric halide, N-succinimidyloxy, sulfo-N-succinimidyloxy, 1-benzotriazolyloxy, 1-imidazolyloxy, p-nitrophenyloxy, and



60. A compound according to claim 58, wherein R₁ is selected from the group consisting of hydrogen, hydroxy, lower alkyl, lower alkoxy, lower cycloalkyl, lower alkenyl, aryl, and heteroaryl.

61. A compound according to claim 58, wherein R₁ is selected from the group consisting of methoxy, hydroxy, and benzyloxy.

62. A compound according to claim 58, wherein R₁ is



63. A compound according to claim 62, wherein m is from 1 to 14.

64. A compound according to claim 63, wherein m is from 1 to 7.

65. A compound according to claim 64, wherein m is from 1 to 4.

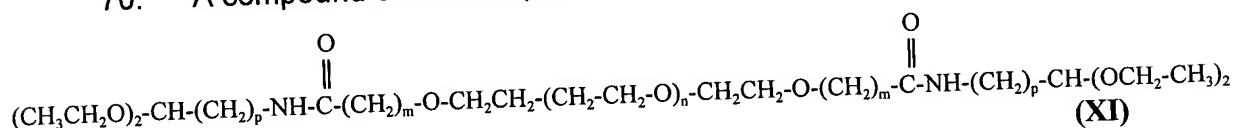
66. A compound according to claim 58, wherein n is from 20 to 5,000.

67. A compound according to claim 66, wherein n is from 50 to 2,500.

68. A compound according to claim 67, wherein n is from 75 to 1,000.

69. A compound according to claim 58, wherein R₁ is methoxy, p is 3, m is 1, and n is from 100 to 750.

70. A compound of formula (XI):



wherein

m is from 1 to 17,

n is from 10 to 10,000, and

p is from 1 to 3.

71. A compound according to claim 70, wherein m is from 1 to 14.

72. A compound according to claim 71, wherein m is from 1 to 7.

73. A compound according to claim 72, wherein m is from 1 to 4.

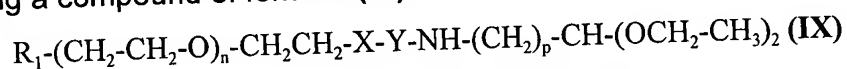
74. A compound according to claim 70, wherein n is from 20 to 5,000.

75. A compound according to claim 74, wherein n is from 50 to 2,500.

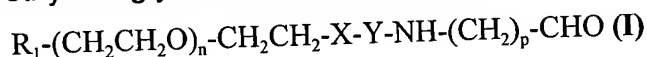
76. A compound according to claim 75, wherein n is from 75 to 1,000.

77. A compound according to claim 70, wherein p is 3, m is 1 and n is from 100 to 750.

78. A method of making a polyethylene glycol aldehyde comprising hydrolyzing a compound of formula (IX):



to produce a polyethylene glycol aldehyde of formula (I):

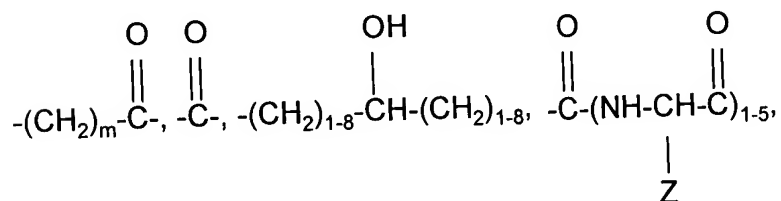


wherein

R_1 is a capping group,

X is O or NH,

Y is selected from the group consisting of

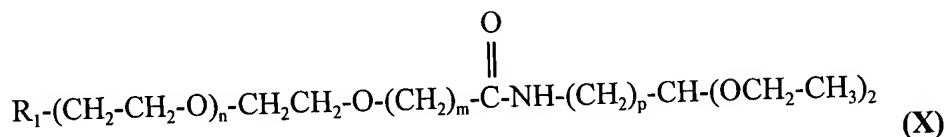


Z is a side chain of an amino acid,

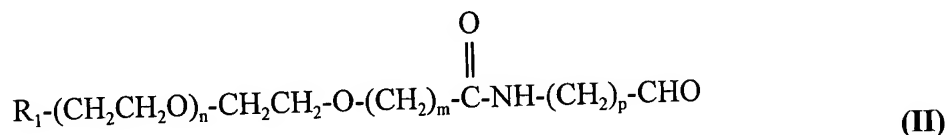
m is from 1 to 17,

n is from 10 to 10,000, and
p is from 1 to 3.

79. A method of making a polyethylene glycol aldehyde comprising hydrolyzing a compound of formula (X):



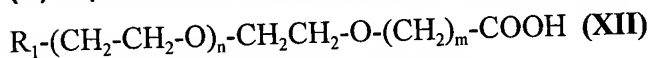
to produce a polyethylene glycol aldehyde of formula (II):



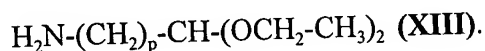
wherein

R_1 is a capping group,
m is from 1 to 17,
n is from 10 to 10,000, and
p is from 1 to 3.

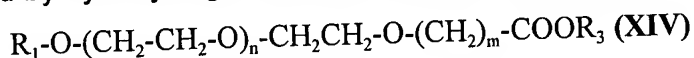
80. A method according to claim 79 wherein the compound of formula (X) is produced by reacting a compound of formula (XII):



with a compound of formula (XIII):

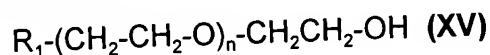


81. A method according to claim 80 wherein the compound of formula (XII) is produced by hydrolyzing a compound of formula (XIV):

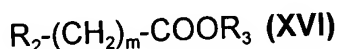


wherein R_3 is a branched or unbranched C_1 - C_4 alkyl.

82. A method according to claim 81 wherein the compound of formula (XIV) is produced by reacting a compound of formula (XV):

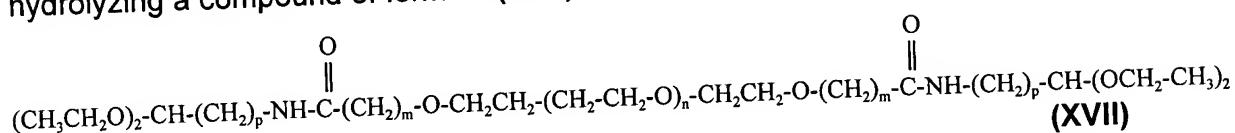


with a compound of formula (XVI):

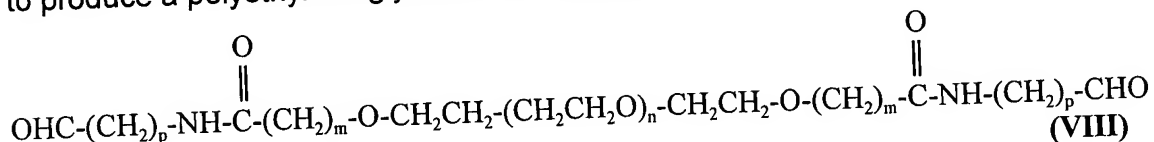


wherein R_2 is halogen.

83. A method of making a polyethylene glycol aldehyde comprising hydrolyzing a compound of formula (XVII):



to produce a polyethylene glycol of formula (VIII):



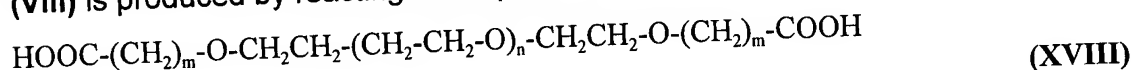
wherein

m is from 1 to 17,

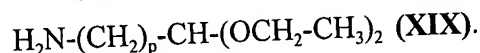
n is from 10 to 10,000, and

p is from 1 to 3.

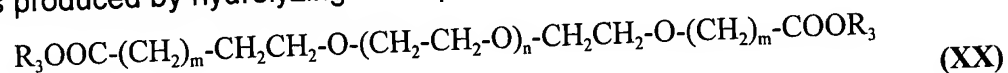
84. A method according to claim 83 wherein the compound of formula (VIII) is produced by reacting a compound of formula (XVIII):



with a compound of formula (XIX):

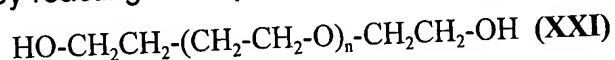


85. A method according to claim 84 wherein the compound of formula (XVIII) is produced by hydrolyzing a compound of formula (XX):



wherein R_3 is a branched or unbranched C_1 - C_4 alkyl.

86. A method according to claim 85 wherein the compound of formula (XX) is produced by reacting a compound of formula (XXI):



with a compound of formula (XVI):



wherein R_2 is halogen.